Ordering number : EN 2740B

Monolithic Linear IC

No.2740B

SANYO

LA7955

Video Switch for TV / VCR Use

Overview

The LA7955 Video Switch IC is used to switch the video and audio signals of TVs,VCRs and similar equipment. Separate pin layouts for the video and audio systems facilitate board design. Two signals can be selected from the three input signals in a symmetrical arrangement using a control signal. Low impedance lines (V_{CC}, GND and control input) between the input and output pins minimize crosstalk caused by the high frequency of the video section. The LA7955 operates on a 12V power supply and is available in 20-pin plastic slim DIPs.

Functions

- Video applications : 3 inputs, 2 outputs
- Audio applications : 3 inputs, 2 outputs × 2 (L,R) channels
- Built-in muting circuits for 2 left and 2 right audio output channels

Features

- Separate video and audio pin layouts
- Built-in 6dB video amps
- Wideband characteristics
- Minimal video and audio crosstalk
- 12V power supply
- 20-pin plastic slim DIP

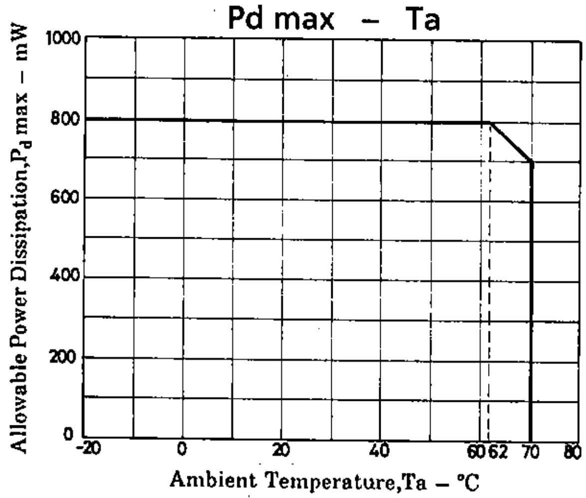
Maximum Ratings at Ta = 25°C

				unit
Maximum Supply Voltage	V_6max		14.4	V
MaximumControl Signal Voltage	V_4max,V_8max,V_{10}max		14.4	V
Allowable Power Dissipation	Pdmax	Ta≦70°C	700	mW
Operating Temperature	Topr		−20 to +70	°C
Storage Temperature	Tstg		−55 to +125	°C

Recommended Operating Conditions at Ta = 25°C

			unit
Recommended Supply Voltage	V_{CC}	12	V
Operating Supply Voltage Range	V_{CC} op	8 to 13.2	V

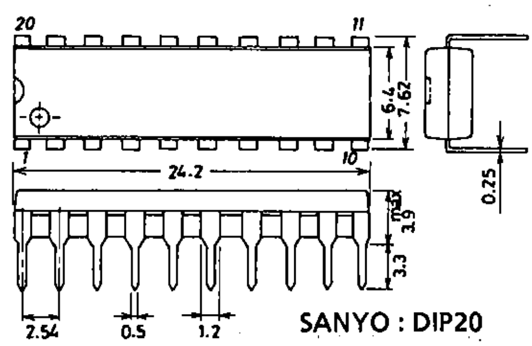
Pd max – Ta



Package Dimensions

(unit :mm)

3021B

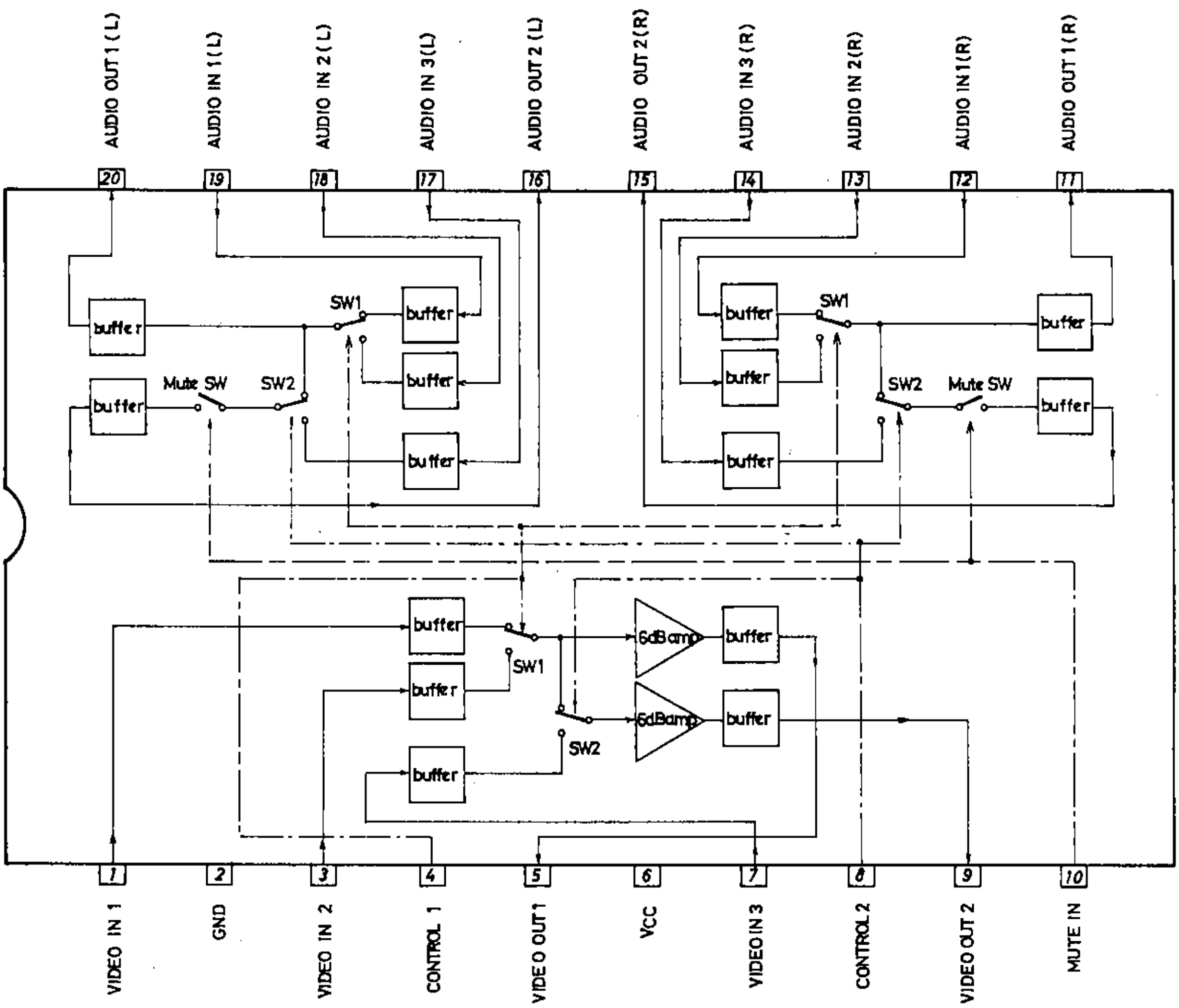


SANYO : DIP20

Operating Characteristics at Ta = 25°C, V_{CC} = 12V			min	typ	max	unit
Quiescent Current	I_{CC}		35	43	57	mA
Video Input Bias Voltage	V_1, V_3, V_7		4.4	4.7	5.0	V
Video Output Bias Voltage	V_5, V_9		6.2	6.8	7.4	V
Video Input Impedance	Z_1, Z_3, Z_7	f = 1kHz	15	21	27	kΩ
Video Output Impedance	Z_5, Z_9	f = 1kHz		42		Ω
Video Voltage Gain	G_{VV}	Vin = 1Vp-p (sine wave) f = 0.1MHz	5.6	6.1	6.6	dB
Video Frequency Bandwidth	BW_V	Vin = 0.7Vp-p (sine wave) −3dB band for 0.1MHz	10			MHz
Output Noise Voltage	Vn_V	Rg = 75Ω, 10MHz band		0.3	1.0	mVrms
Video Crosstalk (between inputs 1 and 2)	CT_{V1}	Rg = 75Ω, f = 3.58MHz	45	50		dB
Video Crosstalk (between inputs 1 / 2 and 3)	CT_{V2}	Rg = 75Ω, f = 3.58MHz	45	50		dB
Video Output Hum Rejection	HR_V	f = 50Hz, Rg = 75Ω	18	23		dB
Audio Input Bias Voltage	V_{12}, V_{13}, V_{14} V_{17}, V_{18}, V_{19}		4.5	5.1	5.7	V
Audio Output Bias Voltage	$V_{11}, V_{15}, V_{18}, V_{20}$		3.2	3.8	4.4	V
Audio Input Impedance (inputs 1 and 2)	$Z_{12}, Z_{13}, Z_{15}, Z_{19}$	f = 1kHz	47	68	88	kΩ
Audio Input Impedance (input 3)	Z_{14}, Z_{17}	f = 1kHz	51	74	95	kΩ
Audio Output Impedance	$Z_{11}, Z_{15}, Z_{16}, Z_{20}$			75		Ω
Audio Voltage Gain	G_{VA}	f = 1kHz, Vin = 500mVrms	−0.5	−0.02	+0.5	dB
Audio Frequency Bandwidth	BW_A	−1dB band (Vin = 500mVrms) for f = 1kHz gain	100			kHz
Total Harmonic Distortion	THD	f = 1kHz, Vin = 500mVrms		0.03	0.2	%
Output Noise Voltage	Vn_A	Rg = 600Ω, 20Hz to 20kHz bandwidth		10	50	μVrms
Audio Crosstalk (between inputs 1 and 2)	CT_{A1}	Rg = less than 4.7kΩ f = 1kHz (Vin = 500mVrms)	75	90		dB
Audio Crosstalk (between inputs 1 / 2 and 3)	CT_{A2}	Rg = less than 4.7kΩ f = 1kHz (Vin = 500mVrms)	75	90		dB
Audio Crosstalk (between L and R channels)	CT_{AS}	Rg = 4.7kΩ f = 1kHz (Vin = 500mVrms)	72	82		dB
Mute Noise	V_{OAM}	f = 1kHz Vin = 500mVrms		0.02	0.1	mVrms
Audio Hum Rejection 1	HR1	Input Rg = 4.7kΩ	40	46		dB
Audio Hum Rejection 2	HR2	Input open	28	39		dB
Switching Control Signal Input High Threshold Voltage	V_{4TH}, V_{8TH}		1.1	1.4	1.7	V
Switching Control Signal Input Leak Current	I_{4L}, I_{8L}				−3	μA
Mute Input High Threshold Voltage	V_{10TH}		1.1	1.4	1.7	V
Mute Input Leak Current	I_{10L}				−3	μA

Note: The current flowing to the IC is positive and current from the IC is negative.

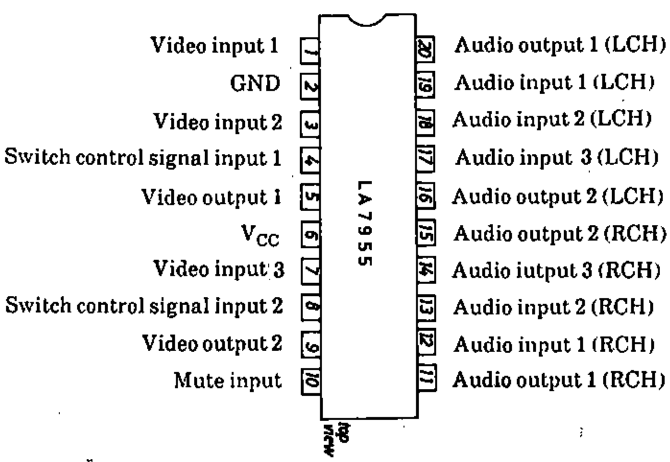
Equivalent Circuit Block Diagram



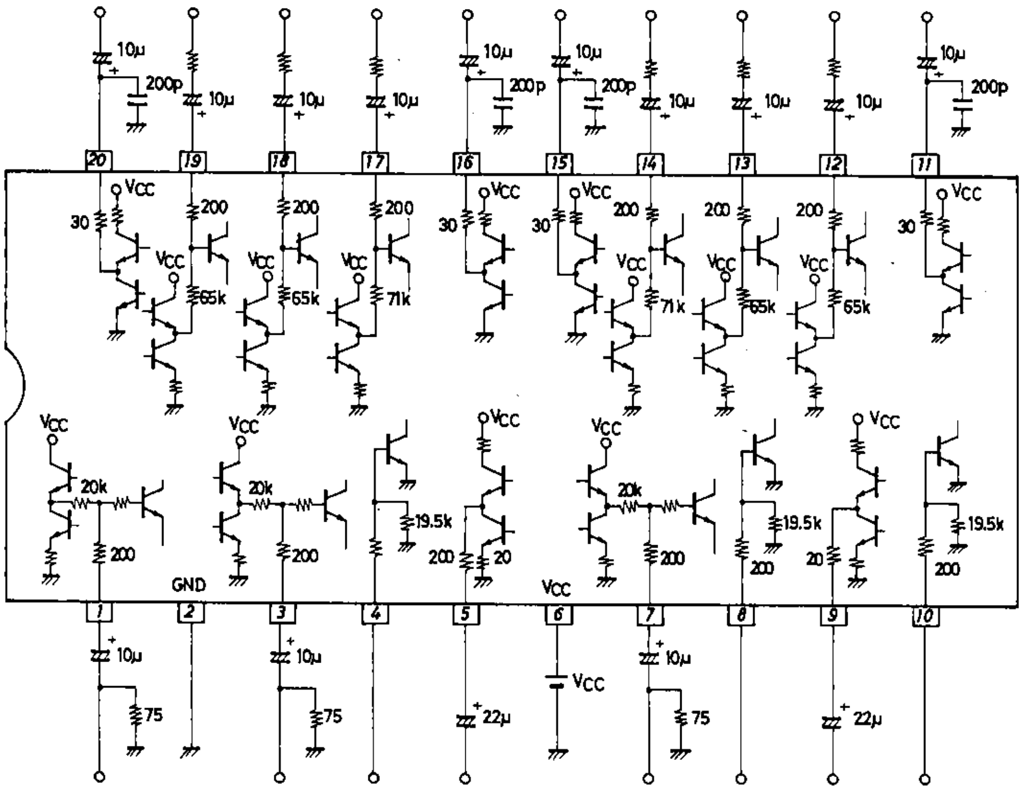
Switching Truth Table

CONTROL 1 (PIN 4)	CONTROL 2 (PIN 8)	MUTE IN (PIN10)	VIDEO OUT		AUDIO OUT			
			1	2	1 L	2 L	1 R	2 R
L	L	L	IN 1	IN 1	IN 1	IN 1	IN 1	IN 1
L	H	L	IN 1	IN 3	IN 1	IN 3	IN 1	IN 3
H	L	L	IN 2	IN 2	IN 2	IN 2	IN 2	IN 2
H	H	L	IN 2	IN 3	IN 2	IN 3	IN 2	IN 3
L	L	H	IN 1	IN 1	IN 1	—	IN 1	—
L	H	H	IN 1	IN 3	IN 1	—	IN 1	—
H	L	H	IN 2	IN 2	IN 2	—	IN 2	—
H	H	H	IN 2	IN 3	IN 2	—	IN 2	—

Pinouts



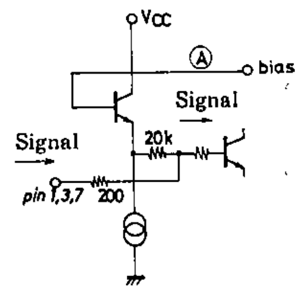
Sample Application Circuit



Unit (resistance:Ω, capacitance:F)

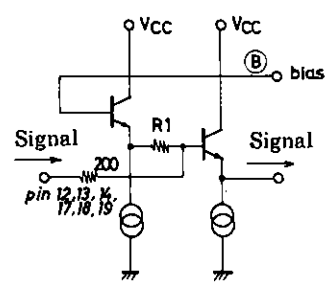
Circuit and Operational Description

1. Video input circuit
   The video input circuit shown in the figure on the right has an input impedance of approximately 20kΩ. The input bias voltage is determined by the bias at point Ⓐ, however, the voltage at this point fluctuates according to V_{CC}.



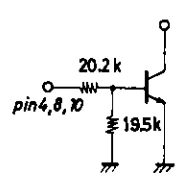
Unit (resistance:Ω)

2. Audio input circuit
   The audio input circuit is shown in the figure on the right. The impedance of audio inputs 1 and 2 (Pins 12, 13, 18, and 19) is approximately 65kΩ, and that of audio input 3 (Pins 14 and 17), approximately 71kΩ. Although the input bias voltage is determined by the bias at point Ⓑ, the voltage at point Ⓑ is supplied from a low-noise Zener diode voltage regulator circuit and is not dependent on V_{CC}.



Unit (resistance:Ω)

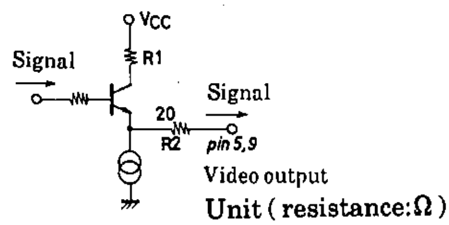
3. Control signal input circuit
   The circuit at input pins for the switching and muting circuits are shown in the figure on the right. The threshold voltage is approximately 1.4V.



Unit (resistance:Ω)

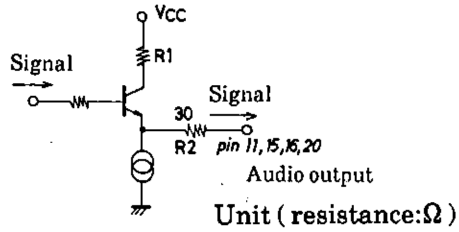
4. Video output circuit

The video output is emitter follower output.

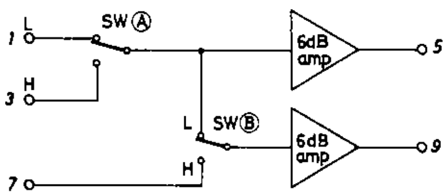


5. Audio output circuit

The audio output is emitter follower output.



6. Video switch operation

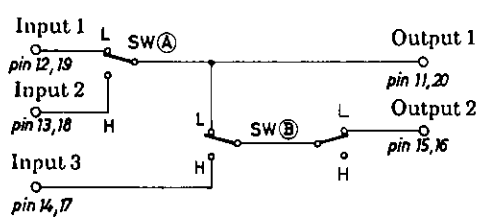


SWⒶ is switched by the voltage of switching control input signal 1 (Pin 4), and SWⒷ, by the voltage of switching control input signal 2 (Pin 8). In addition, there are amplifiers (with 75Ω terminating output pins) with a gain of 6dB at the pre-output stages of Pins 5 and 9. However, an external buffer is required when shorted with a 75Ω resistor.

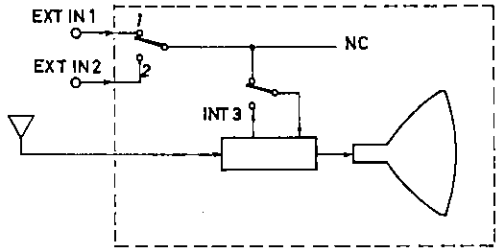
7. Audio switch operation

SWⒶ is switched by the voltage of switching control input signal 1 (Pin 4), and SWⒷ, by the voltage of switching control input signal 2 (Pin 8). Setting the mute input voltage (Pin 10) to H turns the muting switch ON and cutting output 2.

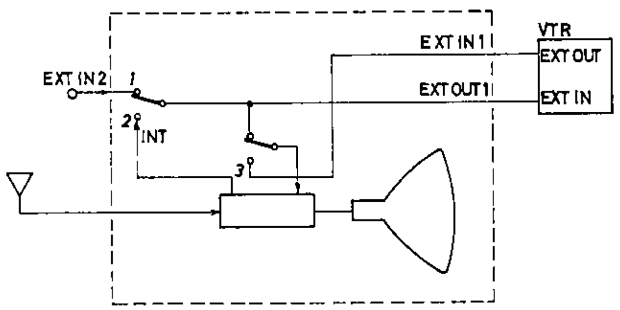
Two pairs of audio switches are built in, allowing use in equipment designs for multiplex broadcast systems.



• Application Example 1 (TV with two video inputs)



• Application Example 2 (TV with video inputs and VCR)



※ Audio output 2 is ideal for TV outputs as it has a built-in muting switch.

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